

CHAPTER 1

SANITATION

In a foodservice operation nothing can rival the importance of the sanitary aspects of food preparation and service. Carelessly handled food is easily contaminated with pathogenic organisms that may lead to illness. This chapter discusses the methods of preventing illnesses arising from poor sanitary practices in the preparation and service of food.

In addition to the hazards of food contamination, which Mess Management Specialist (MS) personnel have always contended with, modern warfare has added other hazardous chemical, biological, and radiological agents that may be used in any future war. Protection of the food supply and decontamination measures in the galley and messing areas are vital to the defense of the ship or station.

FOOD-BORNE ILLNESSES

Food-borne illnesses can incapacitate large numbers of personnel in a short period of time. In addition to the toxins or poisons produced by bacterial growth, certain foods are inherently or naturally poisonous. The poisons in these foods tend to attack the nervous system resulting in such symptoms as weakness or paralysis, numbness, tingling of the ears, apprehension, and even death.

Food-borne illnesses can be classified into the three following basic types: natural or chemical food poisoning, food intoxication, and food infection.

NATURAL OR CHEMICAL FOOD POISONING

Both natural and chemical food poisonings are caused by man; man's carelessness, indifference, or ignorance. Natural and chemical food poisonings are grouped together as one food-borne illness because they both occur naturally. The characteristics that differentiate natural and chemical poisonings are discussed next.

Natural Food Poisoning. In this type of food-borne illness, the food in its natural state contains elements poisonous to humans. As an MS, you will learn of many new foods that are not common to the United States.

Some of these foods are from plants and animals that can cause severe illness and even death when consumed.

Every effort is made to keep poisonous plants off a ship. But sometimes they do get aboard. Toadstools, hemlock mussels (such as those found on the West Coast during the summer), tropical fish (such as toadfish, puffing fish, and certain members of the jack fish family), and in tropical waters, at certain seasons of the year, barracuda can cause poisoning and death. Some types of mushrooms also contain natural poisons. Only an expert can decide whether or not a certain mushroom is fit to eat. The safest rule is to never use unfamiliar foods unless your medical officer approves their use.

Chemical Food Poisoning. Some food-borne illnesses are caused by chemical poisons. In the case of chemical food poisoning, the poisons are introduced into the food accidentally. The following types of chemical poisoning may be experienced in foodservice operations.

Antimony Poisoning

Antimony poisoning is caused by eating food cooked in poorly coated or chipped enameled cooking utensils.

Cadmium Poisoning

Cadmium poisoning may take place if chilled acid foods or drinks are allowed to stand in cadmium-plated metal containers before they are served. Illness may strike 10 to 15 minutes after the food is eaten. Lemonade, fruit punch, tomatoes, raspberry gelatin dessert, and tea containing lemon juice can be contaminated by cadmium. Also, ice trays and metal pitchers plated with cadmium can cause chemical poisoning when filled with cold acid foods.

Cyanide Poisoning

Cyanide poisoning may result if silverware is not properly washed and sanitized after detarnishing.

Zinc Poisoning

Zinc poisoning in food is rare. It may occur when acid foods are cooked in galvanized iron kettles. Outbreaks have occurred when apples have been cooked in this type of kettle.

Lead and Arsenic Poisonings

Lead and arsenic sometimes used to spray vegetables may cause these foods to become poisonous. Be sure all fresh fruits and vegetables are thoroughly washed before you cook them, or before they are eaten raw. Lead poisoning may also result from the ingestion of food or water that has been in contact with lead pipes, lead-plated equipment, and lead-soldered pots and pans. Lead is a cumulative poison; the accumulation of small doses in the body will eventually cause chronic lead poisoning.

Fluoride Poisoning

Fluoride poisoning is caused by sodium fluoride, a substance often used to get rid of cockroaches. It is a white powder that can be easily mistaken for powdered milk. Keep all containers of such poison out of the galley and bakeshop.

Methyl Chloride Poisoning

Methyl chloride poisoning is caused by leaking mechanical refrigerators. Check your equipment for such leaks and request scheduled planned maintenance service (PMS) from the engineering division to detect faulty equipment.

FOOD INTOXICATION

This type of illness is caused by toxins. Under favorable conditions certain bacteria produce chemical compounds called toxins, which, if ingested, cause food intoxication. Staphylococcus is the most commonly reported food intoxication.

Staphylococcus

The staphylococcus germ is found in the throat, on the skin in pimples and boils, and in great abundance in the postnasal drip of people recovering from colds. Consequently, the most prevalent carrier of food intoxication is foodservice personnel. People with any of these symptoms must not be allowed to work in food preparation spaces in any capacity.

Foods most associated with outbreaks of staphylococcus are pork products and fowl. Ham is also susceptible to staphylococcus poisoning and must not be sliced too far in advance of serving unless properly refrigerated.

Other foods commonly involved are potted meats, fish, cheese, milk products (including cream- and custard-filled pastries), and potato and macaroni salads. Foods can contain sufficient toxin to cause food poisoning and yet have no odor of spoilage and no abnormal taste. Even when food has been properly refrigerated, it can become contaminated by bacteria while it is being prepared or while it is standing in the galley before it is served.

Botulism

Botulism is a second type of food intoxication. This disease, usually fatal, is caused by the toxin produced by the rod-shaped bacterium called clostridium botulinum. Botulinum organisms are found in the soil and gain access to foods through contact with soil, dust, and possibly water.

The foods most often responsible for botulism are either canned or fermented foods in which the preserving process has not succeeded in destroying the bacteria in the food. The botulinum grows and multiplies in an airtight container. However, when cans are damaged, leak, bulge, or are sprung, the contents are presumed to be unsafe.

The botulinum organisms sometimes produce a gas and cheesy odor in food, but the absence of these signs does not necessarily mean that the bacteria are not present.

FOOD INFECTION

This type of food illness is caused by microorganisms such as the salmonella, shigella, and clostridium species and the streptococcus, bacillus, and typhoid fever bacteria. A large percentage of food infections are transmitted by foods that have been allowed to remain at room temperature for a prolonged period of time.

The great majority of outbreaks of food infection is caused by meat (poultry, particularly turkey) and meat mixtures. For this reason, poultry dressing should not be served as a leftover. Other foods that may be involved are custards, milk cream, ice cream, seafood, meat, eggs, meat products, shellfish, salads, mayonnaise,

salad dressings, poultry dressing, bread puddings, cream pies, eclairs, and filled pastries.

These microorganisms are transmitted to the food by personnel who are sick or carriers and who are allowed to handle food in the food preparation area.

Salmonellosis

Salmonella bacteria are transmitted by foods, usually from undercooked or semicooked raw foods, or from foods that have become infected after cooking by persons who are harboring the bacteria. Since salmonella bacilli leave the body through the intestinal tract, the main source of salmonella infection is people who do not wash their hands after leaving the head. Consequently, they contaminate all the food they handle. Also, mice, rats, and cockroaches may contaminate food by dragging filth over food and food utensils, or by intestinal deposits that are brushed off into food or containers.

While no specific foods may be said to be responsible for salmonellosis, the ones most likely to harbor the salmonella bacilli are (1) those that are usually eaten raw such as salads and greens; (2) cooked leftover foods that are not reheated thoroughly; (3) foods that are undercooked, especially poultry and uninspected meats; and (4) infected eggs that are eaten raw or undercooked. See "Safe Egg-Handling Guidelines" in chapter 1 of NAVMED P-5010.

Streptococcus

Infections such as septic sore throat and scarlet fever are transmitted by contaminated milk and by certain other foods, including meat, meat products, and dressings. One type of this infection also causes a gastrointestinal disturbance. Floor dust is one of the modes of transmission.

Typhoid Fever

Typhoid fever is transmitted by milk, shellfish, or water supplies that have become polluted with the urine or feces of a person harboring the organism of this disease. It is also spread by human carriers and flies that transport the typhoid bacteria from soiled articles to foods, dishes, and cooking utensils.

Bacillus Dysentery

Bacillus dysentery is transmitted by contaminated foods or water, by human carriers, or by flies. The

bacilli of this disease are found in the bowel discharges of infected persons.

Infectious Hepatitis

Infectious hepatitis is a form of liver disease with symptoms of general discomfort. Jaundice, often characterized by skin yellowing, and other signs of liver injury are sometimes present. The disease is highly contagious. Drinking water or unsanitary conditions and flies or other biting insects may transmit the infectious material.

ANIMAL PARASITES

Animal parasites sometimes enter the body in food and produce infections. Some of these forms of animal life are one-celled. All are so tiny that they are not visible when the food is being prepared.

Amoebic Dysentery

This illness is caused by a one-celled animal, the amoeba. These organisms eat the red blood corpuscles of the body and the cells that line the intestines. The dysentery-producing amoeba is transmitted by foods served cold and moist, such as celery, lettuce, other fresh vegetables, or fresh berries. These foods may be infected by human excreta, by flies, or by having been grown in fields where animal excreta was used as fertilizer.

Trichinosis

Eating infected pork that has not been thoroughly cooked is the most common cause of trichinosis. All fresh pork products must be cooked to an internal temperature of 165°F or above to kill the trichinella worm. Since there is no way of knowing whether or not this parasite is present, the pork must always be thoroughly cooked.

Beef Tapeworm Infection

Beef tapeworms are transmitted by infected beef that has not been cooked long enough to kill the encysted larvae. To prevent ingesting the beef tapeworm, only government-inspected beef should be used. If it is necessary to use beef that has not been inspected, freeze it at 14°F or below for 5 days or longer, or pickle it in a 20- to 25-percent salt solution for 5 days or longer. Cook it well-done; never serve it rare.

Fish Tapeworm Infection

Fish tapeworm is transmitted by infected fish that has not been thoroughly cooked. For purposes of safety, always make sure fish is thoroughly cooked and is never tasted in the raw state.

MOLDS AND YEASTS

Other types of cell life that may not be harmful are molds and yeasts.

Molds

Molds are composed of many cells and maybe very small or large enough to cover an entire wall. They grow best in dark, damp places where temperatures are favorable. Some molds are valuable in the production of medicines such as penicillin; other molds may cause certain infections in human beings.

Molds spoil the taste of food and eventually destroy it. Molds may be removed from certain foods and the remainder of the food used. Consult your medical department on the precautions to be taken.

Yeasts

Like bacteria, yeasts are single-celled. They reproduce by budding. When a bud becomes sufficiently large, it separates from the original cell and becomes an independent cell. Certain yeasts are used in breadmaking, vinegar fermentation, and the manufacture of beverages.

FOOD PREPARATION

It is evident that the foodservice worker is the most important link in the transmission of disease through food. The workers' health, personal habits, understanding of bacteria, and the methods of preparing and serving of food are of concern not only to themselves but also to their shipmates as well.

BACTERIA

An understanding of bacteria is valuable to all personnel and essential to those who work with food in any way. Bacteria are one-celled microorganisms; so small they are visible only under a microscope. They are widely distributed in the air, water, soil, and in animal and plant tissues. Bacteria are classified according to their shape. Those round in shape are

called cocci; the rod-shaped ones are called bacilli; and the spiral-shaped ones are called spirilla.

Since bacteria cannot be seen, our best defense against the harmful bacteria is strict adherence to sanitation principles. Bacteria can move of their own accord only in liquids and cannot leave a fluid surface unless transported as "passengers" by other agents such as dust, food dishes, silverware, cooking utensils, dirty fingers or fingernails, a common drinking cup, a hand towel, water, insects, or rodents.

Bacteria reproduce themselves simply by dividing in half. On the average each bacterium, under favorable conditions, will divide and become two bacteria every 20 minutes. The rate of multiplication or growth of bacteria is affected by heat or cold. Certain types of bacteria, if allowed to grow and multiply, produce toxins that cause food poisoning. Boiling will kill all bacteria, but it will not kill the toxins once they are allowed to form. Certain strains of the staphylococcus bacteria will withstand boiling temperature for long periods of time before they are killed and are virtually impossible to kill by normal cooking methods. Once toxins have been allowed to form, no amount of cooking will make the food safe. Refrigeration will prevent the bacteria from producing toxins but will not kill the toxins once they are formed.

FOODSERVICE PERSONNEL

Since foodservice personnel are considered to be the most likely mode of transmission of disease through food, certain requirements such as medical examinations, sanitation training, and personal hygiene must be completed before such personnel can work in food preparation areas.

Physical Examination

All foodservice personnel including personnel employed by civilian contract services must be examined and determined to be free from communicable diseases before initial assignment in foodservice. Subsequent physical examinations will be conducted annually. The physical examination must be sufficiently comprehensive to detect acute or chronic diseases. Laboratory tests and other diagnostic determinations are performed at the discretion of the senior medical officer; however, all foodservice personnel must be examined for evidence of tuberculosis. Employees of contract services must be examined by either local or military medical

departments to make sure a complete and thorough physical examination has been done.

Personnel having any open lesions, particularly on the hands, face, or neck or acne on the face, are prohibited from performing foodservice duty.

Examination of personnel with questionable medical or social histories must be comprehensive including X-ray of the chest, stool and urine examinations for parasite and bacterial pathogens, and other such determinations as may be indicated by international agreements.

All personnel must repeat medical tests when away from duty for 30 days or more. All personnel must submit to laboratory examinations and other tests to detect and treat acute or chronic diseases and be relieved from duty if they are infected.

Training

All foodservice personnel must be thoroughly indoctrinated in personal hygiene and food sanitation, as well as in the methods and importance of preventing food-borne illness. Temporary foodservice personnel must be indoctrinated as follows:

- All foodservice personnel will receive a minimum of 6 hours' initial training and 6 hours' annual refresher training in foodservice sanitation principles.
- All foodservice sanitation training will be conducted by environmental health officers and/or preventive medicine technicians.

In those cases where it can be shown that environmental health officers or preventive medicine technicians are not available to perform such training, medical department representatives, MSs in paygrade E-5 and above, or civilian foodservice supervisors who have received special training to qualify them as foodservice sanitation instructors maybe used. Special instructor certification training may be taken at either a Navy environmental and preventive medicine unit or naval regional medical center preventive medicine service, and completion of training must be documented. Certified instructors must use and maintain up-to-date, standard Navy lesson plans in their training programs. Instructors must be recertified every 3 years and are authorized to sign the Foodservice Training Certificate, NAVMED 4061/1.

Personal Hygiene

The group of principles and rules designed to promote personal health and cleanliness is known as personal hygiene. The following procedures should be used to ensure personal cleanliness.

TAKE DAILY SHOWER OR BATH.— Maintain a high degree of cleanliness by thoroughly soaping and rinsing the body to remove dirt, perspiration, and bacteria. This practice improves circulation, appearance, and health, and is the foundation of personal hygiene. Frequent washing of hair is mandatory. Keep teeth clean by brushing at least twice daily, but preferably after each meal.

WEAR CLEAN GARMENTS.— Wear clean inner and outer garments. Germs are harbored in clothing as well as on skin surfaces, and diseases are likely to be transmitted. Caps (or hairnets for women) completely covering the hair must be worn at all times when working with food. Keep hair trimmed for neat appearance. Change clothing and aprons soon after soiling.

WASH HANDS BEFORE STARTING AND AFTER FINISHING WORK WITH FOOD.— Provide plenty of hot and cold running water under pressure. Soap and paper towels with adequate waste receptacles must be available. Continuous rolled paper toweling that is sanitary may be used if it is approved by the National Sanitation Foundation Testing Laboratory or meets equivalent standards, but use of such toweling must be supervised.

Thorough washing of hands with hot soapy water to remove soil and contamination before commencing work is mandatory. After each visit to the toilet, all food handlers are required to scrub hands and nails. When interruptions occur during routine duties in the galley, personnel are required to wash their hands before resuming work. Frequent washing of soiled hands during work is also essential. Never wear an apron to the toilet or washroom.

Hands are probably the most common vehicle for transmitting germs. Personnel should keep fingernails closely clipped, trimmed, and cleaned underneath and around cuticle. Cleaning is effective only with soaps or detergents and warm water. Unless clean towels or other satisfactory hand-drying devices are provided, the benefits of frequent hand scrubbing are completely nullified.

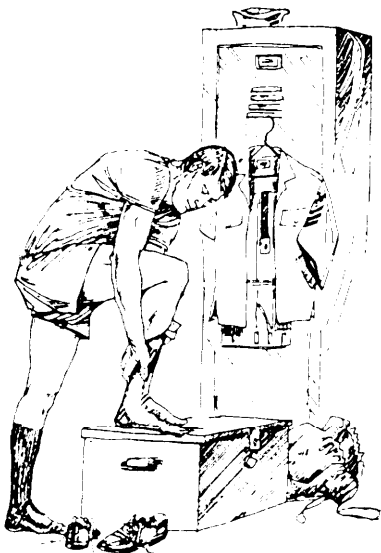
PROHIBIT USE OF TOBACCO.— Smoking in food preparation, serving, or dishwashing areas is

DAILY SHOWER



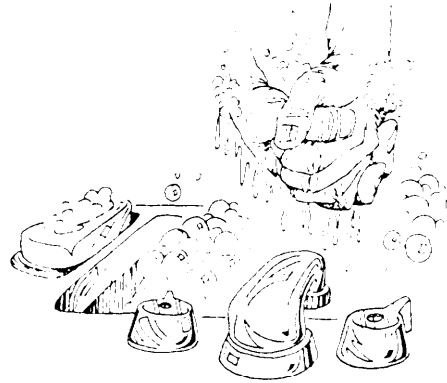
FOR HEALTH AND CLEANLINESS

CLEAN CLOTHES



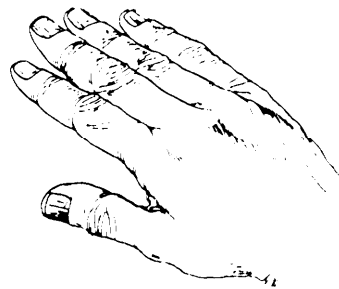
INSIDE AND OUTSIDE

FREQUENT HANDWASHING



VERY IMPORTANT

CLEAN SHORT NAILS



REDUCE DISEASE TRANSMISSION

HAIR CONFINED—WASHED



CAP

NET

Figure 1-1.—Good daily health habits for foodservice personnel.

prohibited. The use of tobacco while preparing or serving food may contaminate the fingers and hands with saliva and may promote spitting and coughing, which transmit disease organisms present in the saliva to food or food-contact surfaces. If smoking areas away from the galley are provided, personnel should use these

designated areas, but thoroughly scrub hands before resuming work to prevent food contamination.

DEVELOP SANITARY WORK HABITS.— A wide range of communicable diseases and infections may be transmitted by food handlers to other personnel through contaminated food and careless practices.

Some of the desirable work habits that personnel should develop to prevent personal contamination areas follows:

- Spoons, knives, and forks should be picked up or touched only by their handles.
- Cups, glasses, and bowls should be handled so that fingers and thumb do not contact inside surfaces or lip-contact surfaces.
- Portable- and fixed-food preparation equipment should be stored so that they require minimum handling by personnel. Improper storage ruins the effect of sanitizing, and excess handling will introduce contaminating material.
- Disposable dinnerware must be handled and dispensed to prevent contamination of surfaces that come in contact with food or with the mouth of the user.
- Tongs, picks, spatulas, scoops, dipping spoons, and other suitable utensils must be used in such a manner to keep manual contact with food at a minimum.

Figure 1-1 shows some of the good daily health habits for foodservice personnel.

REPORT PERSONAL ILLNESS AND ALL MINOR INFECTIONS.— Boils and sore throats are sources of bacteria that can cause severe food-borne diseases. When ill, report it and make arrangements to be relieved of duty. Sores, rashes of any kind, pimples, or other skin eruptions as well as cuts should be reported and medical aid solicited as soon as possible. Both supervisory personnel and operators are responsible for notifying medical personnel if a disease is suspected.

APPLY PROFESSIONAL TRAINING AND TECHNIQUES.— All personnel must be alert to the hazards associated with speedup methods and shortcuts to washing and sanitizing operations. Techniques of sanitizing—including times, temperatures, and routines—should be memorized and applied. The effectiveness of sanitation is directly related to the competence and cooperation of foodservice personnel.

COMPLY WITH SANITARY REGULATIONS.— Public health ordinances and regulations imposed by the Bureau of Medicine and Surgery (BUMED) must be observed in day-to-day foodservice operations. Recognized standards of sanitation embracing accepted public health principles are prescribed by these sources and administration of regulations at each activity will be enforced. Figure 1-2 shows correct and safe work habits you should develop and practice.

PRECAUTIONS

Most food-borne disease outbreaks are due to four factors: (1) preparation of food too far in advance, (2) poor refrigeration of food, (3) careless handling of food, and (4) failure of personnel to follow good personal hygiene habits.

The following precautions should be observed in preparing and serving food:

- Food should be served promptly after it is prepared.
- Any food that has been ground or chopped and is to be cooked later or incorporated in a prepared dish must be refrigerated immediately. Such ground or chopped food should be refrigerated until cooked; once cooked, they should never be saved as leftovers. When food is ground, an increase in the area of contamination and growth of harmful bacteria results. When chilled foods are ground, the grinding process warms the food to the point where bacteria growth may start.
- Place meats that are cut, sliced, or diced in shallow containers, cover with lids or with waxed paper, and refrigerate immediately. The temperature of the meat-cutting room should be maintained at 50°F. Improper handling of meats can result in spoilage as well as in the transmission of disease.
- If you are using individual serving containers, do not put ice on top of containers.
- All fresh pork products must be cooked to an internal temperature of 165°F or above. Never serve raw pork products.
- Keep foods covered at all times except during actual preparation and serving.
- Palletize all subsistence items in storage spaces to facilitate cleaning and air circulation.
- Keep all worktables and benches clean at all times.
- Store food off the deck.
- Keep food preparation utensils, meat grinders, and other similar equipment clean and handle them properly. Food that comes in contact with equipment that is contaminated becomes contaminated also.
- Wash your hands before preparing food.



DON'T BE A THREE-FINGER JOE



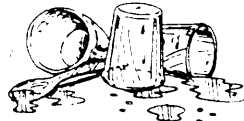
USE TWO HANDS OR A TRAY



DON'T BE A BUTTERFINGERS



USE A FORK



**THOSE YOU SERVE
CAN TRANSMIT A DISEASE TO YOU!**



DON'T



DO



**DON'T PASS BY WASHBOWL
WASH HANDS**



DON'T

Figure 1-2.-Develop and practice correct and safe work habits.

- Do not cough, sneeze, or talk over food while it is being prepared or served.

- Never smoke while you are preparing food. Saliva can be dropped on foods very easily when you are smoking.

- Keep fingers away from the mouth, lips, and face.

- Handle foods as little as possible.

- Use tongs to handle butter, doughnuts, bread, and other similar items of food. Do not use your hands.

Inspections

To make sure all foodservice division rules and directed procedures are being followed, the food service officer and/or designated assistants should make both unexpected daily inspections and thorough weekly inspections of all foodservice personnel, spaces, and

operations. As an aid to conducting an inspection the following items should be checked:

Food handlers. Clean personal appearance that includes clean working uniform (including apron and cap), haircut, clean shave, close-clipped fingernails, head covering, neatness in dress, and absence of cuts, sores, acne, or other indications of skin disorders on exposed parts of head, hands, or arms.

Galley. Deck drains, sinks, and grease traps must be clean and free of any dirt and food particles. Inspect for insect and rodent infestation.

Ranges and grills. Clean and free from grease (ovens, unit cover, drip pan, range grease receptacles, hood and hood filters).

Can opener and base. Clean and free from accumulated grime and food particles.

Deep-fat fryers. Clean, coils clean, basket clean, and in good condition.

Steam-jacketed kettles. Clean under cover and cover-exhaust opening; lids and spigots easily removable without tools for cleaning. Drain clean and free of food particles.

Ovens. Clean and free of burned food and food particles.

Sinks and galley utensils. Clean and neatly stored; steel and plastic sponges (but not steel wool) used for cleaning galley utensils are clean and free of food particles, air dried, and neatly stored.

Mixing machines and attachments, ice-cream machine, meat and vegetable grinders and attachments, and proof boxes. Clean and in good operating conditions.

Cutting boards. Clean and dry, no evidence of cracks or pitted surfaces.

Vegetable-preparation room. Inspect for cleanliness of deck, drains, traps, and sinks. Look for any sign of insect and rodent infestation.

Potato-peeling machine. Dismantled (cover and disk removed), wash-water strainer clean and in good condition.

Slicing and dicing machine. Dismantled, clean (parts oiled if not in use), and in good condition.

Dining area. Inspect for cleanliness of decks, tables, benches, serving tables, coffee urns, milk dispensers, warming ovens, water fountains, and ice

machines; all gear clean and neatly stored. Look for insect and rodent infestation.

Scullery. Decks and gear must be clean. Dishwashing machine dismantled, clean and free of odors, spray pipe clean, racks clean and in good condition, curtains clean and in good condition, thermometers operating properly, and trash and garbage cans clean and tightly covered

Garbage and trash room. Clean, orderly, and free from obnoxious odors; cans clean and tightly covered. Inspect for insect and rodent infestation.

The 4-Hour Rule

Protein foods that are not served immediately after they are cooked should either be chilled to temperatures of 40°F or lower (but not frozen) or held at 140°F or higher. Protein foods include meats, fish, poultry, gravies, meat stocks, soups, eggs, custards, cream fillings, and milk. Growth of harmful bacteria and the development of toxins (poisons) formed by the bacteria occur rapidly in cooked protein foods during holding at temperatures between 40°F and 140°F. Cooked protein foods that have been held at temperatures between 40°F and 140°F for more than 4 hours will be considered unfit for consumption and must be destroyed.

This principle is known as the 4-hour rule. If the product is refrigerated at intervals and then permitted to warm up, the total time of the various periods between 40°F and 140°F must not be more than 4 hours. Protein foods composed of ingredients that are hand-peeled, hand-sliced, or hand-diced after they are cooked should never be used as leftovers; the 4-hour limit between temperatures of 40°F and 140°F is usually taken in preparing, chilling, and serving the food. These foods include potato, chicken, macaroni, shrimp, and egg salads and similar items. Hand preparation not only increases the chance of contamination, but generally increases the length of time that these foods are held at room temperatures. It is also dangerous to return opened jars or bowls of mayonnaise and cooked salad dressing from the salad bar to the refrigerator for reuse at a later meal because of the danger of miscalculation as to the total time that has elapsed from the time that these salad dressings have been held at temperatures between 40°F and 140°F.

Holding Temperatures

Holding temperatures are of utmost importance. Food held at temperatures that are too high or too low

can ruin both the taste and the appearance of food as well as increase the risks of food-borne disease.

HOT FOODS.— The holding temperature of hot foods held on a serving line should be maintained between 180°F and 200°F.

COLD FOODS.— Keep cold foods such as salads, potato salad combinations, and ham plates cold by setting them on ice or on refrigerated salad bar units maintained between 34°F and 40°F.

BEVERAGES.— Beverages should be served hot or cold as applicable. As with food, the quality depends on proper preparation, holding, and dispensing.

Leftovers

When leftovers or warm foods are chilled, care must be taken to ensure prompt and thorough chilling (40°F or below) to the center of the food mass. Foods that are to be refrigerated should be placed in shallow pans to a depth of not more than 3 inches and must be covered with lids or waxed paper. Do not put leftovers in large, deep pans as chilling may take so long to get to the center of the food mass that sufficient time is allowed for the growth of harmful bacteria and development of toxins. Guard against any procedure that might delay cooling. Place foods to be chilled in the chill box immediately. Leftover food must not be saved for more than 36 hours. Freezing of leftovers is prohibited. Foods composed of ingredients that have been peeled, sliced, or diced by hand after cooking must never be used as leftovers since the 4-hour limit between temperatures of 40°F and 140°F is usually taken up in preparing, chilling, and serving the food. To prevent miscalculations in the length of time leftovers have been stored, all leftovers must be labeled with the date and time of preparation.

Frozen Foods

Frozen foods should be thawed in the refrigerator. Freezing breaks down tissue and, therefore, foods can be invaded by germs more rapidly. Once foods are frozen and then thawed, they must not be refrozen. If not eaten, they should be stored under 40°F.

Milk and Milk Products

Milk and milk products and other protein foods are frequent offenders in transmitting infectious diseases to man because of their rapid rate of perishability. Strict surveillance of all handling procedures from cow to man is necessary to prevent contamination and possible milk-borne diseases.

When procured by Navy and Marine Corps activities, milk and milk products must conform in all respects to either federal or military specifications. The perishability of such products is a most important factor, thus strict compliance with all sanitary requirements is mandatory.

Delivery inspections of dairy products are normally conducted by personnel attached to the receiving activities. These inspectors must make sure milk and milk products are from approved sources and delivered in containers that are in good condition and properly sealed. They must make sure the temperature of the product on delivery is 40°F or less or follows the current Defense Personnel Support Center (DPSC) contract.

Of prime importance to medical and foodservice personnel is the maintenance of recommended temperatures in storing (40°F or less), dispensing (32°F-40°F), and enforcing approved sanitary methods in the handling of such products.

Fresh Fruits and Vegetables

Fresh fruits and vegetables should be washed thoroughly under running water to remove any particles of dirt or to remove poisonous insect sprays. Green vegetables of uncertain origin should be suspected of being contaminated with pathogenic organisms. They should be chemically sanitized by immersion for at least 15 minutes in a 100-ppm (parts per million) available chlorine solution, or 30 minutes in a 50-ppm available chlorine solution, or other approved method. Then they should be thoroughly rinsed with potable water before they are cooked or served. Head items such as lettuce, cabbage, or celery must be broken apart before they are sanitized.

Canned Products

Canned foods that appear abnormal in odor or appearance should never be eaten or even tasted, but should be discarded. When you are inspecting canned meats, fish, poultry, vegetables, fruit, and juices, the following factors should be considered.

CAN LABELS.— Check to make sure contents and processing date are stamped on the end of the container or on the label.

CAN EXTERIOR.— The exterior of the can should be examined for general appearance, dents, swelling, rust, and pinholes. Cans having severe dents that cross either the side or end seams or that crinkle the metal to a point similar to those depicted in figures 1-3,

1-4, and 1-5 should not be used. Rusty cans maybe used provided the rust does not penetrate the can. Rust that can be wiped off is not penetrating.

CAN INTERIOR.— Contents should be removed, the can rinsed, and the interior examined for pinholes against a strong light. If pinholes are present, contents should be discarded.

CONTENTS.— Contents of can should be examined for characteristic odor and appearance of the product.

REJECTION OR SURVEY.— Except for coffee and molasses, foods contained in cans displaying the following conditions are unsatisfactory and should be surveyed and disposed of:



Figure 1-3.—Severe angularly dented can with crimping of body.

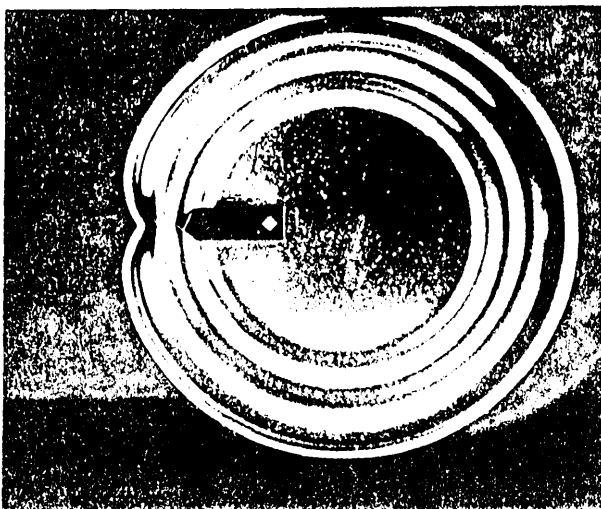


Figure 1-4.—Severe dent that buckles end seam of a can.



Figure 1-5.—A severely dented can in which the end seam is pulled out of position.

Pinholes—tiny holes caused by action of food acids during prolonged storage.

Swells (or swellers)—both ends of cans bulge outward because of bacterial action and gas production. Ends do not yield to finger pressure. (Molasses may bulge in tropical areas, but this condition is not dangerous and the product need not be rejected for this reason.)

Springers—one or both ends bulge outward because of bacterial action and gas. However, this bulge will yield on pressure and spring back to bulge condition on release. Springers or swellers of coffee containers, however, usually indicate a properly sealed container that has merely retained natural coffee-bean gases.

Flippers—both ends are flat, but one end will bulge outward when the opposite end receives pressure. This condition is caused by either bacterial action or chemical action resulting in gas production.

Spoiled or Damaged Food Products

Several precautions eliminate the factors that cause spoiled or damaged food items. These precautions include inspection for quality upon receipt, proper storage and handling, and maintenance of required temperatures relative to each respective phase of the operation. The absence of any one of these precautions may encourage food spoilage and damage.

The following hazardous material should be disposed of accordingly, using the applicable survey procedures outlined in NAVSUP P-486, volume I:

- Cans in unsatisfactory or surveyable condition

- Food products with spoilage or damage indicated by offensive odors, presence of slime, abnormal color, or other evidence of deterioration

- Food items adulterated by easily recognizable foreign material such as metal, glass, dirt, or insects

Do not attempt to taste or cook food in these states. It is safe to observe the old saying, "When in doubt, throw it out." The risk of food-borne illness must be avoided. After any occurrences of spoiled or damaged food, corrective actions must be provided and measures must be designed to prevent future occurrences.

KEEPING UTENSILS AND EQUIPMENT CLEAN

All phases of sanitation in a general mess are important. However, one of the most important is the proper cleaning and sanitizing of equipment (including trays, dishes, and other dinnerware) used for preparing, handling, cooking, and serving food.

Dishes may be washed by hand or by machine. Whatever the method, the final results may either be excellent or poor, depending upon how conscientiously you apply your knowledge and skill in using the equipment and materials provided. The best equipment and detergents will not do a good job of dishwashing if used improperly.

Types of Soil

Unless the galley equipment and utensils are thoroughly cleansed, food particles in which bacteria may grow will remain on them. These food soils are divided into several distinct types:

Freshly deposited soil—the soil that remains immediately after the equipment or utensil has been used.

Thin film—the soil that remains as the result of ineffective cleaning, following a flushing with water. Thin films are not easily seen and they are capable of sustaining germs.

Built-up deposits—the result of repeated ineffective cleaning methods causing a day-by-day accumulation of soil.

Dried deposits—accumulations that result from drying action and formation of a heavy crusty deposit.

Baked deposits—deposits that have been baked onto equipment and have become difficult to remove.

Removing Stubborn Soils

The Navy procures the correct type of detergent to be used in washing food preparation utensils and equipment. Hot water also provides temperatures that increase the chemical activities of the various ingredients in properly compounded detergents. Friction is an important part of cleaning. The required friction may be applied by brushing with approved brushes or by strong flushing, as in dishwashing machines. A hard abrasive should never be used on any metal surface. This results in scratches that provide lodging places for soil. It is recommended that pots and pans, cooking utensils, and other such items be presoaked to loosen any food clinging to the utensil. Then, they should be washed using the proper detergent compound and hot water. A detergent increases the effectiveness of the water as a cleaning agent. The washed pots and pans must be rinsed with warm water at 120°F to 140°F, then sanitized for 30 seconds in hot water of 170°F or for at least 1 minute in an approved chemical sanitizing solution such as the standard stock chlorine-iodine type. Once washed and sanitized, the clean pots and pans should be stored, bottoms up, in clean racks. Otherwise, the effort spent in washing and sanitizing them is wasted. Figure 1-6 shows the

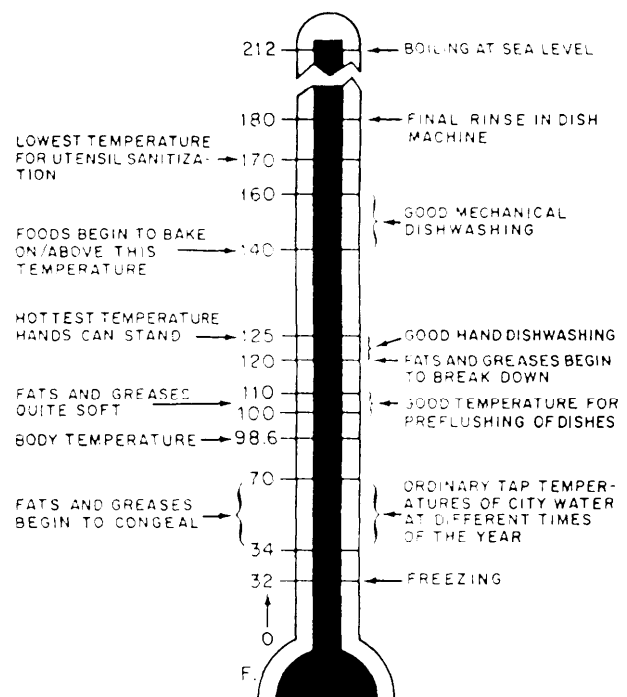


Figure 1-6.—Temperatures necessary for proper sanitizing of foodservice equipments and utensils.

temperatures necessary for the proper cleaning and sanitizing of foodservice equipment and utensils.

Hand Dishwashing

The equipment provided for manual dishwashing varies from a one-compartment sink to the preferred three-component sink. A remote dial thermometer and a booster heater should be installed under the final

rinse compartment. Regardless of the type of sink on board your ship or station, the procedures outlined in figures 1-7 and 1-8 should be filled.

Machine Dishwashing

High-standard dishwashing demands that the machine be kept clean inside and out. Lime deposits from water should not be allowed to accumulate inside

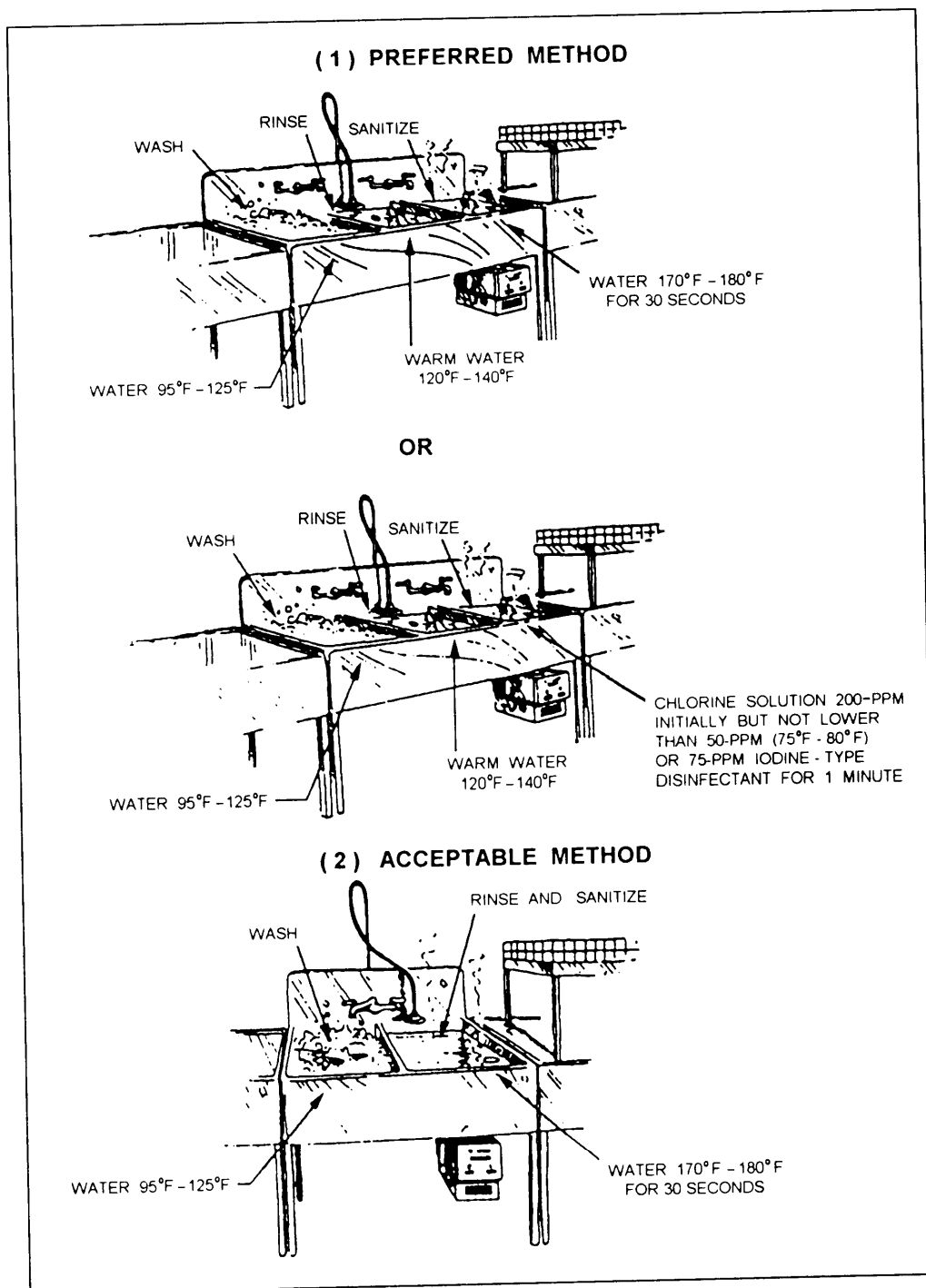


Figure 1-7.—Methods for manual washing of dishes and cooking and serving utensils.

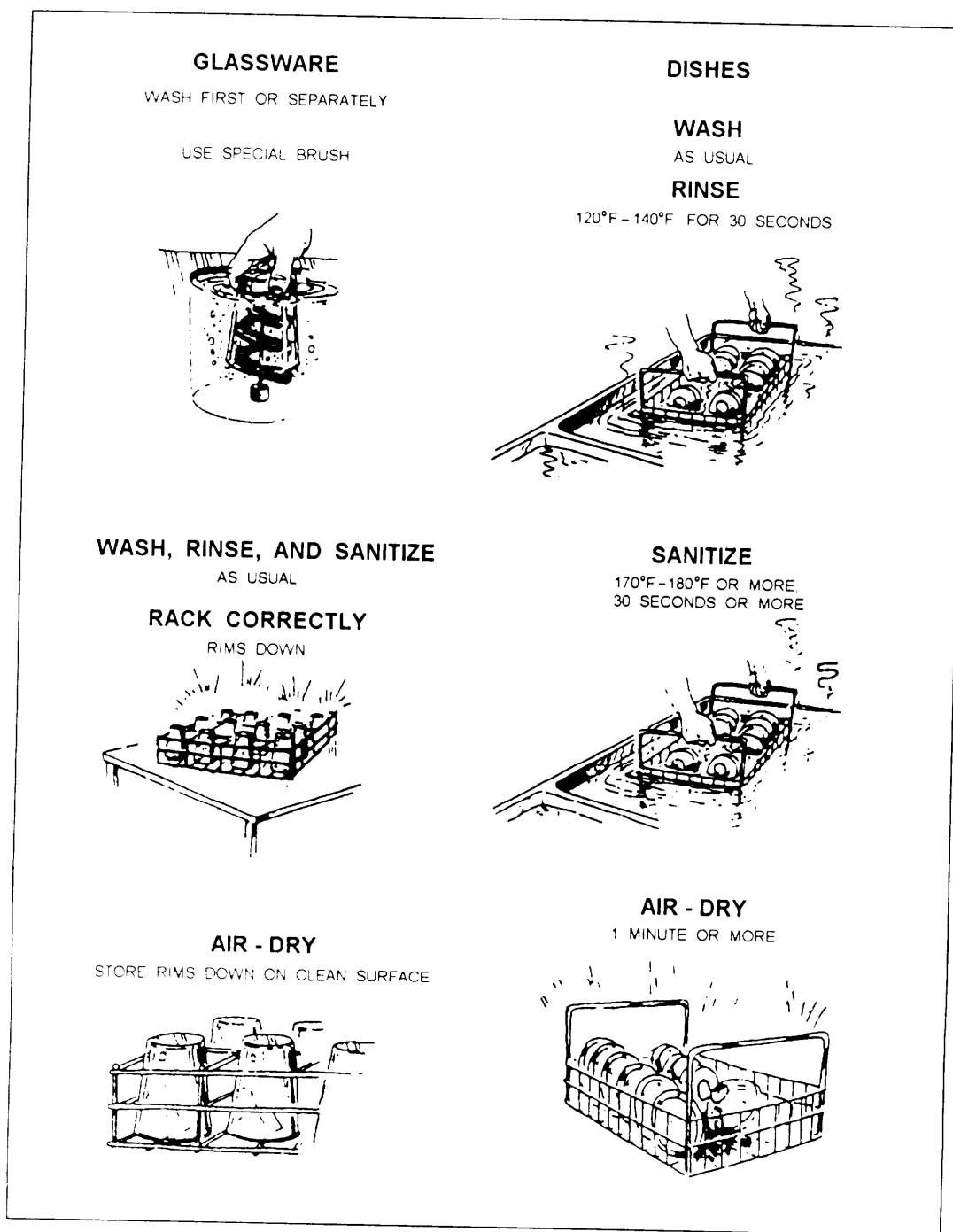


Figure 1-8.-Checkpoints in manual dishwashing.

the tanks even to slightest degree. The machine must look and smell clean.

Machines properly maintained will operate with efficient service over a long period of time. If neglected, dishwashing machines, like any piece of mechanical equipment, will bring on costly repairs and decreased efficiency in cleaning and sanitizing.

Preflushing of dishes will help avoid clogging of spray nozzles with food particles. Clean wash water will prevent a buildup of bacterial population and subsequent contamination. Do not let wash water enter the rinse tanks. A dishwashing machine is not a garbage disposal, and an accumulation of food scraps and grease greatly hampers the washing operation. Check the

water flow pressure, using a proper gauge. On spray-type machines, flow should not be less than 15 pounds per square inch nor more than 25 pounds per square inch for the final rinse.

The procedure for racking gear for washing is equally as important as preflushing. All items should be racked to permit washing solutions and spray rinses to contact the surfaces of the articles. Overloading as well as improper placement of items on racks will impede the operation.

SANITATION OF FOODSERVICE SPACES

Galleys, the bakeshop, vegetable preparation areas, food storage and refrigeration facilities, and any other facilities or equipment in which food is prepared, served, or dispensed constitute the total physical plant of the foodservice operations. It is mandatory to keep these spaces in sanitary condition at all times.

Decks, Bulkheads, and Overheads

Regular after-meal cleanup is necessary to prevent an accumulation of filth, and frequent in-between cleaning is required if deck cleanliness is to be maintained at a peak standard. When food is spilled, it should be wiped up immediately.

No attempt should be made to sweep down decks and dining areas during food preparation and service, as dust rises in the air and will fall on foods and worktables. Pick up wastes and deposit them in proper receptacles.

Vacuum cleaning is the recommended method for dry cleaning bulkheads and overheads.

Ventilation System

Good air circulation is a basic requirement of proper sanitation because it reduces condensation of steam and minimizes heat, vapors, smoke, fumes, odors, and soiling. Mold and bacterial growth are inhibited whenever there is ample, dry, clean air.

Prevent grease from accumulating on hood appliances. Accumulations of grease can drip either into food being prepared or onto surfaces of equipment where contamination of food is possible. Filters should be removed and soaked in a hot (180°F), strong detergent solution. Scrub with a brush. Rinse under running water or by applying steam from a hose. Removable filters may be run through the dishwashing machine.

Lighting System

Sufficient lighting in all areas of food storage, preparation, and service, and in scullery operations is a fundamental requirement of proper sanitation and safe working conditions. Grease, dirt, and vermin can be more easily detected and corrected where there is ample light.

Routine cleaning of light fixtures and light bulbs will contribute to adequate lighting and eliminate the accumulation of dirt and grease film.

Storage Areas

Fresh and frozen food items are perishable and must receive proper handling in transit and storage to reduce risk to the health and welfare of personnel who prepare and eat foods. During loading and unloading on docks, piers, or on board, you should keep areas as clean as possible. Long exposure to weather will hasten spoilage. Daily checks on the sanitation of dry, freeze, and chill spaces are essential. Mold and decay go hand in hand with poor housekeeping. Decks, deck gratings, bulkheads, and overheads should be cleaned, sanitized, and aired as often as possible. Cleaning and defrosting of refrigerated spaces should proceed when stocks are low.

Cleaning gear (for example, swabs and brooms) and cleaning supplies (for example, detergents, disinfectants, and other toxic materials) should be stored in areas specifically designated for their purpose. These items should not be stored in food storage cabinets or on food storage shelves.

Dressing Rooms, Lockers, and Toilet Facilities

Street clothes should never be worn in the galley. Adequate, clean, and orderly facilities should be provided for personnel to keep and change clothing to be worn when performing routine duties in foodservice operations. Adequate space should be provided for hanging up these pieces of clothing because they can contaminate food, food equipment, and food preparation surfaces. Dressing rooms or designated areas for changing and storing clothing must be located outside the areas where food is stored, prepared, and served. Dressing rooms and lockers must be clean and orderly at all times.

Conveniently located toilet facilities must be accessible to personnel at all times. These areas must be adequately equipped with proper waste receptacles, toilet paper, and an approved hand-drying device or

sufficient disposable towels. Heads should be located within or immediately adjacent to toilet areas as well as within food preparation areas. These heads must be kept in a clean and orderly appearance. An authorized soap dispensing system and hot and cold running water are also required for use by personnel.

Garbage and Trash Disposal

The method of collection and disposal of garbage may differ on various ships or stations, but the basic requirements are the same. Garbage must be disposed of promptly to prevent contamination of spaces and to eliminate a possible fire hazard.

Garbage and refuse must be kept in leakproof, nonabsorbent containers and a sufficient number should be provided to prevent overfilling. Containers will be emptied as necessary during operations and at the close of each workday. After being emptied, each container should be thoroughly cleaned, inside and outside, in a manner that will not cause contamination of food, equipment, utensils, or food preparation areas. Suitable facilities, including hot water and detergent, should be provided and used for washing the containers.

Ashore galleys and outside refuse and garbage storage areas or enclosures should not be located within 100 feet of the foodservice facility. They should be placed on or above a smooth surface of nonabsorbent material such as concrete or machine-laid asphalt. These surfaces must be kept clean and in good condition.

Food waste disposers or grinders may be used for garbage disposal provided they are designed and/or located in a reamer that prevents contamination of food contact surfaces as a result of a splash and aerosol generation. Potable water should be used as a flushing medium unless otherwise indicated by BUMED.

Insect and Rodent Control

According to BUMED, the term *vector* is used to refer to all insects, rodents, and related animals that are significantly related to the transmission of disease to man, act as intermediate hosts or reservoirs of disease, present problems of sanitary or hygienic significance, or otherwise affect the health and efficiency of personnel.

Programs for controlling vectors are command responsibilities coordinated through public works programs and medical departments. Because the first and most important step in control is to destroy breeding

grounds, basic sanitation measures for which foodservice personnel are responsible must be strictly enforced.

The foodservice facility and its adjacent grounds must be kept clean and free of litter and debris. Openings to the outside should be effectively protected against the entrance of rodents and insects by use of self-closing doors, closed windows, screens, air curtains, or other means. Screens should be tight-fitting, free of breaks or tears, and not less than 16 to 1 mesh. However, screens are not required in air-conditioned foodservice spaces where windows or portholes are sealed closed.

Space Cleanliness

In most foodservice operations, a space inspection is conducted before securing. At most commands the inspection is conducted by the duty supply officer or a senior MS. Areas of concern are sanitation, fire, safety, and security.

Always remember that strict sanitation procedures should be followed in all areas of foodservice operations. Cleanliness can never be overemphasized.

FOOD SERVING AREAS.— All serving lines should be equipped with a functional sneeze shield. It must present a barrier between the oral zone of patrons within the normal range of stature and the food displayed for service.

Proper cleaning and sanitizing procedures for foodservice equipment on the line and around the serving area are equally important in the galley. A number of regulations attendant to serving food must be observed to reduce the possibility of food infection. All pans, serving utensils, and counters must be kept immaculately clean and sanitized.

Self-service salad bars must be carefully supervised to prevent contamination of food items by patrons, thereby preventing the transmissions of pathogenic organisms from one person to another.

FOOD PREPARATION AREAS.— High standards of sanitation and cleanliness must be maintained at all times in these areas. As an MS, you will practice and enforce the “clean as you go” policy for every foodservice person. Cleaning in this way helps maintain high sanitation standards as well as cut down on the cleanup time after the meal and at end of the workday. Wash your hands and equipment first before starting to prepare food items. Contaminated hands or equipment leads to contaminated food. Keep

worktables sanitized and immaculate y clean. Do not use steel wool for cleaning. Smoking is not permitted in any foodservice areas.

RECEIVING AND FOOD STORAGE AREAS.— Before receiving and storing food items, it is very important that loading docks, piers, or areas where foods are received and stored must be thoroughly cleaned to avoid food contamination. Stores must be inspected for the presence of cockroaches and other insect pests before they are stored. Correct storage procedures play a major role in preventing food-borne illnesses and increasing the storage life of food. High levels of sanitation and safety must be maintained in all food storage facilities. Food items should be safely palletized or placed on shelves in an appropriate manner. This proper storage allows proper cleaning and prevents insect and rodent infestation.

DEFENSE AGAINST RADIOLOGICAL, BIOLOGICAL, AND CHEMICAL AGENTS

The nature of the radiological, biological, and chemical contamination problem and the basic procedures to be followed when decontaminating food, galleys, spaces, and equipment are discussed in the following paragraphs.

DEFENSE AGAINST RADIOLOGICAL AGENTS

Radiological defense includes all such measures to minimize personnel and material damage from radioactivity. The basic responsibility for this function resides with the damage control organization of the ship or station. Your basic guidance in radiological defense matters will come from them. Supply department personnel are normally assigned appropriate duties according to the damage control plan. You should be aware of the plans and procedures to be followed on board your ship or station.

Emergency operations are those that immediately follow the blast. During this period, a realistic evaluation of the disaster is made and initial steps toward recovery are taken. Protective clothing monitoring equipment and decontamination gear will also be needed.

RADIOLOGICAL CONTAMINATION

Blast damage and thermal radiation may result in partial or complete destruction of messing facilities and

food items. Radioactivity is important because of the effect it has on the human body. Because of its ability to penetrate matter deeply, gamma radiation is usually considered to be the most hazardous. Since the principal source of alpha particles would be the unfissioned nuclear material of the weapon, the probability of significant alpha contamination from nuclear detonation is small. Beta particles have poor penetrating ability. Ordinary clothing will stop beta particles. They enter the skin only to a depth of about one-fifth of an inch, but their ionizing power is about 100 times that of gamma rays. When ingested with food, inhaled, or admitted into the body through cuts or open wounds, beta particles meet no barriers and become particularly destructive if they are retained in the body for sometime. Therefore, in food preparation and service, all forms of radioactivity should be regarded as hazardous.

Radioactivity may be introduced into exposed materials that are close to the burst. Such items as soap, table salt, copper, or brass may become radioactive as a result of radiation (the action of neutrons). Radioactivity may also be carried by blast residues, the principal one being dust particles. A person contaminated by radioactive materials can easily contaminate an otherwise safe object or area. If the person handles foods, the foods can become contaminated. Radioactivity cannot be destroyed by cooking or sterilization; neither can it be neutralized by chemical treatment. It must be removed as completely as possible to a limit of radioactivity set by the command authority in the light of existing circumstances.

MONITORING TO DETERMINE EXTENT OF RADIOACTIVITY

Radioactive materials can only be removed by physical means. The extent of radioactivity existing in any food preparation or serving area should be determined by a survey with radiac monitoring equipment. This includes the galley utensils, food for preparation, dinnerware, the scullery, and all personnel involved in food preparation and service. If the survey so indicates, it may be necessary to reestablish the mess in another area designated as safe by the commanding officer.

The supply officer is responsible for taking the necessary precautions to make sure the food served is free from radioactive contamination. Galleys and other food preparation spaces, food, equipment, utensils, dinnerware, and personnel engaged in the foodservice operation should be carefully monitored by qualified persons with appropriate monitoring equipment to learn

the presence and the extent of radioactive contamination.

Decontamination operations should be carried out as required. Food items in glass or metal containers or sealed in barrier-wrap packages are the least likely to be contaminated. These should, nevertheless, be monitored, and care should be exercised upon opening such packages to avoid contamination. The fresh water supply should be monitored. Food items should be monitored in their dry state because dilution with water will substantially lower the beta readings and the presence of alpha particles may not even show up on radiac instruments. All food items, when they have been monitored, must be clearly marked as Contaminated or Safe for Use. All food items should be cleared for use after monitoring if found to be within acceptable limits established by the local command according to the *Radiation Health Protection Manual*, NAVMED P-5055.

RADIOLOGICAL DECONTAMINATION

There are various methods of removing contamination. They differ in effectiveness in removing the contaminant, in applicability to given surfaces, and in the rate of operation. These, in general, fall into two classes, gross or rough decontamination and detailed decontamination. Gross decontamination consists of a rapid washing down with large quantities of uncontaminated water from a fire hose or nozzle system. This class is generally not suitable for use in galley and messing areas except for decks. Detailed decontamination procedures are more thorough. These procedures use more time, manpower, and material, but they are also more effective. Detailed decontamination will be necessary in galley and messing areas. Efforts to decontaminate with heavily contaminated water will obviously be ineffective. However, water contaminated to a lesser degree than the surface contamination to be removed may still be used. Water used for decontamination must be allowed to drain freely from contaminated areas. Water from tightly covered storage tanks should be safe and potable, provided the circulating system is tight. Water from open reservoirs cannot be relied upon to be free from contamination. Seawater in the neighborhood of an aerial burst to windward will be contaminated at the surface. A subsurface burst will heavily contaminate seawater in the vicinity. General knowledge of the local situation and a monitor survey should provide data on which a decision regarding the water supply will be based.

When materials (cleaning agents) specifically designed for the removal of radioactive contaminants are available, they should be used according to instructions and the material safety data sheet (MSDS). When they are not available, the following solutions are suggested for the general cleaning of galley surfaces:

Formula 1

Detergent general-purpose, liquid, water-soluble, type I, 1/2 pound. Military specification MIL-D-16791.

Sodium phosphate, tribasic, technical (trisodium phosphate), 1/2 pound. Federal specification O-S-642, type II.

Water, hot, 12 gallons, 100 pounds.

Directions: The sodium phosphate should be completely dissolved by stirring it into hot water. The liquid detergent should be added and stirred until it is thoroughly dispersed.

Formula 2

Dishwashing compound, machine, granular, free flowing. Federal specification P-D-425a (specify whether hard or soft water will be used).

Directions: The compound should be dissolved in hot water to make a 0.5 percent (approximate) solution (1 pound per 25 gallons of water).

The solution should be hot when it is used.

Formula 3

Citric acid, monohydrate, granular form. Military specification MIL-A-11029 (Cml), Change No. 3223.

Directions: Citric acid should be dissolved by stirring to make a 3 percent (approximate) solution (3 pounds per 12 gallons of water). In use, utensils should be immersed and metal surfaces should be sprayed.

Except for citric acid, the previous materials are commonly used and are readily available. The suggested formulas are not intended to take the place of agents specified in existing decontamination instructions. They constitute the bare minimum as substitutes and should serve to meet immediate emergency requirements. All chemical cleaning agents function most efficiently when hot. The choice of method and cleaning agent to be used should depend upon the nature of the surface to be decontaminated, the kind and degree of contamination, and the time, manpower, and materials available to do the work.

All these cleaning agents are hazardous materials. Always wear goggles and protective gloves when

mixing these solutions, and consult the MSDS for specific precautions.

Decontaminating Foods

All food should be carefully monitored. Foods in metal or glass packages may be safe. Contamination is best removed from the external surfaces by washing. Food items in sealed, dustproof packages may also be safe, provided the wrapper is not broken. To remove the contamination from these packages, vacuum them and carefully remove the outer wrap. Some vegetables can also be decontaminated if they are carefully washed, dried, monitored, and peeled-if monitoring shows contamination is not above specified limits. When surface contamination cannot be physically removed, the food should be condemned. All foods must be inspected and approved by the medical officer.

Decontaminating Spaces and Equipment

Thorough cleaning of all surfaces is vital. Work should commence overhead and continue downward in the direction of the liquid flow. When feasible, the first step should consist of flushing the surfaces with safe water. Do not get water on electrical controls that are not waterproofed. The second step involves systematic scrubbing with chemical cleaning agents. Piping, ductwork, stanchions, bulkheads, coamings, and decks should be repeatedly scrubbed until monitoring indicates that a safe condition exists. Bare metal surfaces should be given an initial scrubbing with alkaline detergents to remove grease film. When available, citric acid solution should then be applied and allowed to remain for a minimum period of 10 minutes. Rinse the surface with safe, fresh water, allow to dry, and monitor. In the absence of citric acid, vinegar may be used, but it is less effective.

Decontaminating Utensils and Dinnerware

Treat metal utensils and dinnerware such as metal tableware and cutlery in the same manner as other metal surfaces. Wash with a detergent followed by an acid treatment. When possible, immerse utensils and dinnerware in the acid solution. Crockery and glass present no particular cleaning problem, provided the glazed surfaces are without scratches or foreign deposits such as stains or hard water scale. Plastic ware may present some difficulty because of the relatively porous character of the surface, scratches, and the presence of foreign deposits. Both glassware and plastic ware should be machine washed, rinsed, dried, and each item

monitored. Those that do not pass should be inspected for cracks and surface defects. Cracked and badly scratched items should be disposed of immediately. The other items still showing contamination should be given repeated washings until safe, or they should be segregated to await natural decay of contamination or disposal of the item.

Protection of Personnel

When you are engaged in decontamination, wear protective clothing as prescribed by the ship's damage control bill. If protective clothing is not available, similar garments may be substituted. Care must be taken to make sure substitute clothing adequately prevents radioactive particles from coming in contact with the skin or gaining entry to the body by ingestion, inhalation, or through breaks in the skin. Masks should be worn. In the absence of regulation masks, chemical goggles should be worn to protect the eyes. A high efficiency particulate air (HEPA) filter respirator also can be used to protect the lungs.

Spaces that were not contaminated, or that have been decontaminated, must be carefully protected. All personnel and material must be carefully monitored (decontaminated if needed) before anyone is permitted to enter these spaces. Cleaning gear, items of protective clothing, and so forth, used in decontamination procedures should be segregated and disposed of as contaminated according to their level of contamination.

To familiarize yourself with protective clothing and equipment, and with the procedure for adapting regular issue clothing for NBC warfare protection, see *Military Requirements for Petty Officer Third Class*, NAVEDTRA 12044.

Preventing Recontamination

Contaminated items brought accidentally into spaces should be removed and, pending decontamination of the affected areas, these areas should be roped off. Personnel who may have walked through these areas or who may have otherwise come in contact with radioactive particles should be sent to the decontamination station.

DEFENSE AGAINST BIOLOGICAL AGENTS

The United States has renounced all use of biological agents in warfare, but the need still exists to be prepared to defend ourselves against these agents if

other countries should use them. The following section, therefore, discusses the nature of biological agents and the measures you should use to decontaminate the galley, messing areas, and food storage spaces in the event of enemy biological attack.

A biological agent is defined as a microorganism that either causes disease in man, plants, and animals or causes the deterioration of material.

The chief objective of biological agents is mass infection that results in the incapacitation or death of large numbers of individuals or in the destruction of their sources of food, both animal and plant. The biological agents, unlike most other weapons, act on living matter only and are limited in use to these objectives.

In case of a biological attack there are certain instructions that should be carried out for the protection and decontamination of eating, drinking, and galley utensils; galley and foodservice equipment; and messing areas contaminated by biological agents.

Good sanitary and hygienic practices are the best defense against many aspects of biological warfare. A close examination of the cleanliness of the mess and strict adherence to the applicable instructions will improve biological defense greatly.

The problems of biological agents differ from ordinary military hygiene problems only in that harder types of organisms may be present in other than their normal environment and in higher levels of contamination.

BIOLOGICAL CONTAMINATION

In treating the problem of biological attack, it is assumed that there could be contamination of personnel, of all exposed surfaces, and of circulating air. Because of the current difficulties in rapidly detecting biological agents, knowledge of contamination might (although not necessarily) be based on the occurrence of widespread or unusual sickness. This sickness could be caused by contamination that had occurred several days or weeks before. A situation could exist also whereby extensive use of biological agents would require additional precautions in the operation of all messes. These instructions are intended for use in the event of suspected or known biological attack. The problem is to decontaminate and prevent recontamination.

BIOLOGICAL DECONTAMINATION METHODS

Use calcium hypochlorite (bleach) solutions for biological decontamination. Scrub the interior surfaces of contaminated spaces with 200-ppm chlorine solution to remove dust and grease. Then, hose spaces with fresh, safe water and repeat the process. You may also use iodine solutions prepared by the medical department.

Large equipment (those items too large to be immersed in sinks or run through dishwashing machines) should be washed, rinsed, and decontaminated in the same manner as prescribed for interior surfaces of messes. Small items of equipment that will not suffer damage by immersion should be washed, rinsed, and sanitized in the dishwashing machine or by hand dishwashing as described earlier in this chapter.

Before eating and drinking utensils are brought to the scullery for decontamination, the interior bulkheads, all working surfaces (tables, dish carts, and sinks), the interior and exterior of the dishwashing machine, and all other equipment used in the washing and sanitizing of eating and drinking utensils should be thoroughly washed, rinsed, and decontaminated as appropriate.

Eating and drinking utensils should be decontaminated by machine or hand washing. A person who has handled contaminated utensils should not handle decontaminated utensils until the person has been decontaminated. Decontaminated articles should not be placed in contact with any surface that has been exposed to contamination. If possible, use baskets or containers designed to hold silverware in a vertical position, handles down, during the washing and sanitizing processes, and additional containers of similar construction into which the silverware may be inverted without being handled by workers. If such containers are not available, lay the silverware flat in the racks, not exceeding two utensils, with the handles extending in the same direction. Do not exceed a depth of two utensils. Take care when removing utensils from the racks after decontamination to prevent recontamination.

Sterilization by hypochlorite solution should be used only when dishwashing machines do not operate correctly. The utensils should be soaked, while still in the washrack, for 1 full minute at 100°F to 140°F in a solution of 1 part hypochlorite and 50 parts water in a single-tank machine, or 1 part hypochlorite and 500 parts water in a double-tank machine; one-fifth of 1 percent of a detergent must be added to either solution.

This solution may be mixed from nonionic detergent and any one of several chlorine containing compounds such as calcium hypochlorite, or laundry bleach.

In storage, compounds containing chlorine have been known to deteriorate. It will be necessary, therefore, to have a qualified person from the ship's company analyze the soaking solution for chlorine content to make sure the proper concentration of available chlorine is attained and continued at sufficient strength.

After the sterilization, soak and water rinse, cover the washracks containing the utensils with a cloth that has been sterilized by boiling. Do not transfer utensils to another rack. Make sure personnel in the serving line pick up utensils from the washracks by touching only the handles.

Large equipment may be decontaminated by the use of hypochlorite. Hypochlorite is corrosive to all metals that will rust and should not be allowed to come in contact with motors and other electrical equipment from which hypochlorite could not be thoroughly wiped off. After decontamination, cover as much of the equipment as possible with clean cloths to prevent recontamination.

Avoidance of Recontamination

Recontamination may be caused by secondary aerosols that resettle organisms on surfaces or contaminate the air that is breathed. Secondary aerosols are clouds formed from particles (bacteria or other organisms) that, having been deposited on a surface, are stirred up into the air again by scuffing, shaking, or other mechanical action. Secondary aerosols may be suppressed by wetting surfaces with oil or water. If oil is used as a suppressant, it must not generate harmful vapors and it must not be applied to walking surfaces which may create slippery conditions.

It is important to make sure, before entering the messing area, MS personnel and all personnel eating in the messing areas are as free as possible from contamination. The medical officer should be consulted on the decontamination of foodservice personnel. In cold weather, personnel in the serving line should be required to remove outer garments and leave them outside the messing area before entering the mess. It has been found that removing clothing will shake off organisms that have come in contact with the surfaces, thereby setting up secondary aerosols. Do not permit unauthorized personnel in foodservice spaces.

Hypochlorite is a strong oxidizer and, in powdered form, reacts violently with oils and greases. Use hypochlorite in a well-ventilated area. Always wear goggles and protective gloves, and consult the MSDS for additional precautions.

Decontaminating Food Items

The advice of the medical officer must be sought before any attempt is made to decontaminate food suspected of biological contamination.

Semiperishable Food Items

Food packed in containers that are resistant to the passage of biological agents (sealed containers made of metal, plastic, glass, or porcelain) requires only proper exterior decontamination be performed. Paper labels and paper covers must be removed from the container and one of the following methods of decontamination should be used:

1. Immerse the containers for 15 minutes in a solution of water to which 200-ppm available chlorine has been added and then rinse them with potable water.

2. Soak the containers for a minimum of 15 minutes in effective detergent solution as a quick method to reduce contamination to a safe level (see formula 1 discussed under the heading Radiological Decontamination); then rinse them with potable water.

3. The exterior surfaces of stacks of food packed in impermeable packages can be sterilized using any of the standard chemical methods such as bleach solution, sodium carbonate, or DS2 followed by rinsing in potable water.

Food packages that will not stand immersion must be wiped off with a solution of water to which 200-ppm available chlorine has been added and the food thoroughly cooked before it is eaten.

Fresh or Chill Items

Food that can be peeled or pared may be decontaminated by soaking for 15 minutes in water to which 200-ppm available chlorine has been added before it is peeled. The food must then be thoroughly rinsed in potable water. It can then be peeled or pared and should be rinsed again with potable water. This method has been applied satisfactorily to apples, potatoes, and eggs.

For other fresh or chill items, the use of heat is the most practical means of decontaminating foods.

Thorough cooking will reduce contamination to a safe level so that food can be consumed.

Frozen Items

Food items stored in the freeze space in impermeable containers (tamed frozen strawberries, for example) may be decontaminated by immersing the containers for 15 minutes in a solution of water to which 200-ppm available chlorine has been added; the containers are then rinsed with potable water.

Food items stored in the freeze space in permeable containers (frozen vegetables, for example) may be decontaminated as outlined earlier for food packaged in sacks or other permeable containers.

Food items stored in the freeze space, but not contained in outer packaging (meat, for example), must be completely thawed and thoroughly cooked before they are eaten.

Additional Precautions

Hands should be free of contamination during the opening operations to make sure the contents are not contaminated. Opened cans of fruit jam, jelly, or similar foods must be destroyed. Opened cans of vegetables may be decontaminated by boiling the vegetables for a minimum of 15 minutes in a steam-jacketed kettle.

Biological Decontamination in Food Preparation

The use of heat is the most practical means of decontaminating biologically contaminated foods. In no case should decontaminated food be consumed until it is pronounced safe by a medical officer. It is recommended that, insofar as possible, only foods contained in impermeable packages (cans, bottles, jars) be decontaminated and used for meal preparation.

Food items that are not packaged or that are packaged in permeable containers may be cooked by either cooking in a pressure-type cooker at 15 pounds of pressure at 250°F (or 121°C) for 15 minutes or boiling for a minimum of 15 minutes.

Certain contaminated items may be decontaminated by baking. Only those recipes listed in the *Armed Forces Recipe Service* (AFRS) that specify an oven temperature of 400°F and above, for a cooking period of 30 minutes or longer, should be used to prepare baked items from contaminated ingredients.

All meats except those contained in decontaminated impermeable containers (canned meat items) must be cooked to the well-done stage. Guidance cards in the AFRS include information on internal temperatures indicating the well-done state.

Biological Decontamination of Water

The detection of water contamination and requisite laboratory analysis are responsibilities of the medical department. Biological decontamination of water is not difficult when regular water treatment facilities exist. However, more chlorine probably will need to be added during the ordinary processing of the water. If no water treatment facilities are available, water can be decontaminated by any of the following methods:

1. By boiling for 20 minutes
2. By using iodine tablets coupled with boiling

A medical officer should approve the method of decontaminating; after the decontamination process, the officer should determine whether or not the water is fit to be used. Water that has been decontaminated must be protected against further contamination.

DEFENSE AGAINST CHEMICAL AGENTS

The United States has committed itself against initiating the use of chemical agents. However, it is necessary to be prepared against attack by an enemy using this type of warfare.

A chemical agent is defined as a solid, liquid, or gas that, through its chemical properties, produces lethal or damaging effects on man, animals, plants, or material, or produces a screening or signaling smoke.

Chemical warfare agents, like the biological warfare agents, are used mainly because of their effect on personnel, although some agents will have a corrosive effect on specific materials, and incendiary devices will burn most materials. These agents produce a harmful physiological reaction when applied to the body externally, inhaled, or ingested. Most chemical agents cause disorganization of the functioning of the body.

The degree of contamination of the messing area and equipment depends on the chemical agent used and the factors involved, such as the method of delivery (vapor, light liquid, and heavy liquid), the weather, and the various strengths of contamination.

The following paragraphs prescribe the methods to be used in decontaminating eating, drinking, and galley utensils; galley and foodservice equipment; and messing areas that are contaminated by chemical agents.

Vapor Contamination

After the surrounding areas have been decontaminated, the entire general mess should be aerated thoroughly and the entire area washed down inside and out with safe water. All equipment and utensils used in the preparation and service of food should be washed carefully using normal procedures. Spaces, utensils, and equipment should then be tested with the chemical agent detector kit and, if necessary, any of the prescribed procedures should be repeated.

Light Liquid Contamination

The messing area inside and out should be washed with hot water. You may add an alkaline detergent, such as a standard general-purpose detergent, and if applied at high pressure, it will increase the water's effectiveness. As an alternative method, for mustard gas, you may apply a bleach solution to all surfaces. After washing down, aerate the entire area. If slight contamination remains, the area should be heated to as high a temperature as possible for about 1 to 2 hours. Then the spaces should be opened and ventilated for 15 minutes. Repeat the procedure as necessary, testing at intervals with a chemical agent detector kit. Porous objects, such as meat blocks and wooden benches, may absorb liquid contamination to the extent that they will have to be destroyed. Metal, glass, or china utensils or any equipment that is not damaged by water should be immersed for 30 minutes in actively boiling water. Add 1 cupful of alkaline detergent to each 5 gallons of water. Upon completion of the boiling process, you should follow normal dishwashing procedures. Plastics generally cannot withstand boiling water and should be destroyed.

Heavy Contamination of Liquid

Heavy contamination of liquid is unlikely, except from a direct hit, in which case recovery of the space

and contents will be a major undertaking. However, when such is the case, the following procedures are recommended.

Space should be roped off or abandoned as unsalvageable, as no amount of washing or scrubbing of a porous surface that is heavily contaminated by a liquid chemical agent (particularly mustard gas) is likely to do much good.

Metal, glass, or china utensils or any equipment that is not damaged by water should be decontaminated in the same manner as prescribed for light contamination of liquid discussed earlier.

Large equipment unsuited for immersion in boiling water should be scrubbed vigorously with DS2 solution or hot water and an alkaline detergent, rinsed, disassembled, and scrubbed again paying particular attention to any parts not reached in the assembled state that are reachable in the disassembled state. Then, the equipment should be rinsed, dried, oiled, greased, and reassembled. Wooden items should be removed and destroyed.

On electrical equipment, unless the electrical unit is enclosed in a watertight seal, water must not be used in the decontamination process. Electrical equipment should be cleaned with trichloroethane or DS2 solution. All greases must be removed, bearings cleaned, and the equipment regressed.

Trichloroethane and DS2 are toxic chemicals. Protective clothing and respirators should be worn when they are used, and the MSDSs should be consulted for additional precautions.

Careful inspection must be made of the general situation before large quantities of food or water suspected of chemical agent contamination are destroyed. Contaminated food and water must be destroyed in some cases; in other cases, they may be salvaged by special decontamination procedures. In any event, the responsibility belongs to the medical department to determine whether food or water contaminated by chemical agents should be decontaminated or destroyed.

